

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-17. (CANCELLED):

Claim 18. (ORIGINAL): An optical system including at least one optical element having intrinsic birefringence, wherein the birefringence in the optical system for all pencils of light contributing image forming satisfies the formula:

$$b < \lambda/4$$

where b denotes wavefront deviation caused by birefringence (unit: nm), and λ denotes a wavelength in use (unit: nm).

Claim 19. (ORIGINAL): An optical system according to claim 18, wherein the birefringence n includes birefringence by stress, while the stress birefringence is substantially zero, and the intrinsic birefringence is less than $\lambda/4$.

Claim 20. (ORIGINAL): An optical system according to claim 18, wherein the birefringence b further satisfies: $b < \lambda/10$.

Claim 21. (ORIGINAL): An optical system according to claim 18, wherein the birefringence b further satisfies: $b < \lambda/20$.

Claim 22. (ORIGINAL): An optical system according to claim 18, wherein each optical element consists of an isometric crystal, and a relationship between an axis in a crystal orientation of the optical element and an optical axis is so configured that the intrinsic

birefringence of the optical system is $\lambda/4$ or less.

Claim 23. (ORIGINAL): An optical system according to claim 22, wherein each optical element consists of an isometric crystal, and a relationship between an axis in a crystal orientation of the optical element and an optical axis is so configured that the intrinsic birefringence of the optical system is substantially $\lambda/10$ or less.

Claims 24-40. (CANCELLED).

Claim 41. (ORIGINAL): An optical system according to any one of claims 1 through 39, wherein the optical element is one of a lens, a diffraction grating, a parallel flat plate, an optical film, and a combination thereof.

Claim 42. (ORIGINAL): An exposure apparatus that uses ultraviolet radiation, deep ultraviolet radiation, or vacuum ultraviolet radiation as exposure light, which is projected onto an object to be processed through the optical system according to claim 41 to expose the object to be processed.

Claim 43 (ORIGINAL): A device manufacturing method comprising the steps of:
projecting the light for exposure onto the object to be processed using the exposure apparatus according to claim 42; and

performing a predetermined process against the object to be processed to which the light has been projected and exposed.

Claim 44. (PREVIOUSLY PRESENTED): A projection optical system for projecting a pattern of a mask, said projection optical system comprising

plural optical elements, which include an isometric crystal in which an angle between a [0 0 1] axis and an optical axis of the projection optical system is less than 10° ,

wherein the pattern on the mask includes a repetitive pattern and a repetitive direction of the repetitive pattern differs from directions of two axes that are perpendicular to the $[0\ 0\ 1]$ axis of the isometric crystal.

Claim 45. (PREVIOUSLY PRESENTED): A projection optical system for projecting a pattern on a mask, said projection optical system comprising

a plural optical elements which includes an isometric crystal in which an angle between a $[0\ 0\ 1]$ axis and an optical axis of the projection optical system is less than 10° ,

wherein the pattern on the mask includes a repetitive pattern and a repetitive direction of the repetitive pattern forms one of angles of 0° , 45° , and 90° with respect to a primary direction on a plane that includes the mask, and

wherein directions of two axes that are perpendicular to the $[0\ 0\ 1]$ axis of the isometric crystal differ from the primary direction.

Claim 46. (NEW): A projection optical system for projecting a pattern of a mask, said projection optical system comprising a plurality of optical elements made of isometric crystals in which an angle between each $[0\ 0\ 1]$ axis of the isometric crystals and an optical axis of the projection optical system is less than 10° ,

wherein the pattern on the mask includes a repetitive pattern and a repetitive direction of the repetitive pattern differs from directions of $[1\ 0\ 0]$ and $[0\ 1\ 0]$ axes that are perpendicular to the $[0\ 0\ 1]$ axis of the isometric crystals.

Claim 47. (NEW): A projection optical system for projecting a pattern on a mask, said projection optical system comprising a plurality of optical elements made of isometric crystals in which an angle between each $[0\ 0\ 1]$ axis of the isometric crystals and an optical axis of the

projection optical system is less than 10° ,

wherein the pattern on the mask includes a repetitive pattern and a repetitive direction of the repetitive pattern forms one of angles of 0° , 45° , and 90° with respect to a primary direction on a plane that includes the mask, and

wherein directions of $[1\ 0\ 0]$ and $[0\ 1\ 0]$ axes that are perpendicular to the $[0\ 0\ 1]$ axis of the isometric crystal differ from the repetitive direction.

Claim 48. (NEW): An optical system according to any one of claims 46 or 47, wherein the optical element is one of a lens, a diffraction grating, a parallel flat plate, an optical film, and a combination thereof.

Claim 49. (NEW): An exposure apparatus that uses ultraviolet radiation, deep ultraviolet radiation, or vacuum ultraviolet radiation as exposure light, which is projected onto an object to be processed through the optical system according to claim 48 to expose the object to be processed.

Claim 50. (NEW): A device manufacturing method comprising the steps of:
exposing a wafer to a device pattern using the exposure apparatus according to claim 47;
and
developing the exposed wafer.